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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,490	03/31/2004	Toshihisa Takeyama	KOT-0094	8491
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CANTOR COLBURN, LLP 20 Church Street 22nd Floor Hartford, CT 06103			EXAMINER ANGEBRANDT, MARTIN J	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 01/15/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/815,490	<b>Applicant(s)</b> TAKEYAMA, TOSHIHISA	
	<b>Examiner</b> Martin J. Angebrannt	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 November 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,4 and 7-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4 and 7-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed. The rejections of the previous office action not repeated below are withdrawn based upon the amendment to the claims.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabata et al. '340, in view of Kouge et al. '596.

Kawabata et al. '340 in examples 16-18, a mixture of cationically curable materials, free radical curable materials (bis(4-acryloxydiethoxyphenyl)methane), a radically polymerization initiator, a sensitizing dye (dye 1) and a triphenylsulfonium hexafluorophosphate as the cationic polymerization initiators (table 4, col 11) which was applied to a glass plate and overcoated with a polyethylene film, exposed to the interference light and then postcured with a flood exposure from a mercury lamp (7/55-8/40). The use of various onium salts is disclosed. (6/8-18).

Kouge et al. '596 teaches the use of various sulfonium salts for cationically polymerizing materials using light and/or heat (3/12-19). These are evidenced in table 2, 3 and 5 to thermally cure more rapidly than similar triphenylsulfonium salts.

It would have been obvious to one skilled in the art to modify to cited example of Kawabata et al. '340 by using the inventive sulfonium compounds in place of the triarylsulphonium compound used as the photoinitiator with a reasonable expectation of forming

a useful photosensitive composition based upon the disclosure of equivalence by Kouge et al. '596 and the resulting composition would be thermally cationically curable at a temperature in the 40-150° C.

The binder compounds disclosed at [0148-0157] of the prepub are small molecules, which are capable of forming a binder. They are not polymeric. The claims do not require that these be polymers, so while it might be considered a little misleading, the claims as interpreted through the specification clearly does not require these to be polymers. The examiner is well ware that there are two initiation systems, but the applicant's analysis fails to appreciate that the sulfonium salts can be activated either through heat or light (UV). The applicant also fails to appreciate that sulfonium salts, including those set forth in the claims, inherently can initiate either free radical or cationic polymerization as evidenced by Kawabata et al. '340 and if the applicant wishes to exclude the case where a single compound can be used for either type of initiation (thermal vs. photo or free radical vs cationic), then the photoinitiation should be specified. If the applicant intends to further describe these, then the specification should be amended to identify those compounds disclosed in the references cited at [0095] which of the references they are found in and provide copies of those references. **The claims rejected under this heading are directed to the composition, and so the argument regarding use are merely intended use, the exception being claim 20, which does not describe the curing of the binder compound, but does describe irradiating the composition with light or subjecting it to heat. If the intent is to limit the claims to the thermal cure, then the claims should have this as a required step.** The applicant argues as if two different polymerization systems are not taught by Kawabata et al. '340, this is flawed on its face. The modification of Kawabata et al. '340

through the teachings of Kouge et al. '596 is merely exchanging one sulfonium for another, noting that there is a disclosure of equivalence between only seven sulfonium compounds, so there cannot be excessive picking and choosing required.

The rejection has been modified to address the added limitation, with Kouge et al. '596 establishing the ability of the sulfonium salts disclosed in that reference to initiate polymerization at lower temperatures than similar triphenylsulfonium salts. Therefore, the showing in the declaration of Toshihisa TAKEYAMA is not unexpected in view of the prior art and cannot be held to establish unobvious results. Although it is moot, the examiner notes that the comparison was with compounds in column 1, not the identified column 3.

Claim 20 remains rejected, noting that it does not include the limitation of the binder component/precursor having an oxetane moiety and that the argued position is not commensurate with the scope of coverage sought.

4. Claims 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohkuma et al. '634, in view of Kouge et al. '596.

Ohkuma et al. '634 in examples 6-8, a mixture of cationically curable materials, free radical curable materials, a radically polymerization initiator (4-diethylamino-ethylbenzoate), a sensitizing dye (dye 1, methylene blue) and a triphenylsulfonium trifluoroacetic acid as the cationic polymerization initiators (col 15) which was applied to a glass plate and overcoated with a polyethylene film to a thickness of 7 to 23 microns, exposed to the interference light and then postcured with a flood exposure from a mercury lamp (11/4-65). The use of various onium salts is disclosed. (9/35-10/30).

It would have been obvious to one skilled in the art to modify to cited example of Ohkuma et al. '634 by using the dialkylaryl or cyclic sulfonium compounds in place of the triarylsulphonium compound used as the photoinitiator with a reasonable expectation of forming a useful photosensitive composition based upon the disclosure of equivalence by Kouge et al. '596. The trifluoroacetic acid is present as the counter ion and is consider acid multiplying (see prepub of instant specification at [0108]).

Claim 20 remains rejected, noting that it does not include the limitation of the binder component/precursor having an oxetane moiety and that the argued position is not commensurate with the scope of coverage sought.

5. Claims 1,3-9,14,16,17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohkuma et al. '634, in view of Kouge et al. '596, further in view of Otaki et al. '744,

Otaki et al. '744 teach cationically curable materials including epoxies, cyclic ethers and oxetane rings (5/25-42). The use of 3-ethyl-3-[(2-ethylhexyloxy)methyl]oxetane and bis{[1-ethyl(3-oxetanyl)]methyl}ether as photo-cationically curable materials is disclosed. (5/40-42)

In addition to the basis above, it would have been obvious to use other cationically curable moieties, such as 3-ethyl-3-[(2-ethylhexyloxy)methyl]oxetane and bis{[1-ethyl(3-oxetanyl)]methyl}ether, in place of epoxide monomer used in the media resulting from the combination of Ohkuma et al. '634 and Kouge et al. '596 with a reasonable expectation of forming a useful holographic recording medium based upon the disclosure of equivalence by Otaki et al. '744.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Ohkuma et al. '634 and Otaki et al. '744 references are both within the holographic field and all the references are concerned with photopolymerization, including cationic polymerization and so are analogous. One skilled in the art would expect the cationically curable monomers disclosed by Otaki et al. '744 to be curable in the system resulting from the combination of Ohkuma et al. '634 and Kouge et al. '596 and based upon their use in holography, be suitable to for holographic processing. The rejection stands.

The argued position misunderstands the invention, the oxetane containing compound is a precursor for the polymeric binder, please note that the compounds in sections [0152-0157] are cured, thereby reacting the oxetane ring to form the binder. The rejection suggests the exchange of the cationically curable monomers having of Ohkuma et al. '634, which uses the polymerization of the free radical monomers to record the holographic pattern, followed by curing of the cationic and any remaining free radical monomers with a flood cure to form the binder, for the oxetane containing monomers, such as 3-ethyl-3-[(2-ethylhexyloxy)methyl]oxetane and bis{[1-ethyl(3-oxetanyl)]methyl}ether, disclosed by Otaki et al. '744. There is a reasonable expectation of success based upon their disclosed equivalence within the art by Otaki et al. '744. The rejection stands.

6. Claims 1,3,4,7-14 and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar et al. '551, in view of Ohkuma et al. '634, Otaki et al. '744, Kouge et al. '596, Roth et al. '814 and Hegel et al. '008.

Dhar et al. '551 teach in example 1, an acrylate monomer and CGI-784 as the photoinitiator mixed with matrix precursors dibutyltin dilaurate, diisocyanate terminated polypropylene glycol and dihydroxypolypropylene glycol, which are heated (13/65-15). Examples 3 and 4 are similar, place the composition between two glass slides with a spacer and after curing of the matrix are used to record holograms. The ability to form thick recording layers of more than 200 microns is disclosed. (3/13-19,4/3-12). Useful photoactive monomers including acrylates are disclosed as useful in this system. (6/51-67). A reduction in shrinkages of the hologram is also realized (7/1-48). The use of various reactions including cationic epoxy or vinyl ether polymerization to form the matrix is disclosed. (6/26-50)

Roth et al. '814 establishes that sulfonium salts are able to thermally initiate cationic polymerization (1/9+).

Hegel et al. '008 teach in example 1, an acrylate monomer and IRG-784 as the photoinitiator mixed with matrix precursors dibutyltin diacetate, diisocyanate terminated polypropylene glycol and dihydroxypolypropylene glycol, which are placed between 1.2 mm substrates with a 500 micron spacer and after curing of the matrix [0031-0040]. The formation of holograms using these is disclosed. [0052-0056]. Useful photoactive monomers including acrylates are disclosed as useful in this system. [0029]. A reduction in shrinkages of the hologram is also realized. The provision of antireflection coatings on one or both of the substrates is disclosed. [0016,0018]. The substrates may be 0.5-1.3 mm thick [0019].

It would have been obvious to modify the teachings of Dhar et al. '551 by using an epoxy precursor such as those resulting from the combination of Ohkuma et al. '634 and Kouge et al. '596 as discussed above for the matrix based upon the disclosure and the evidence of



compatibility in holographic systems including free radically curable compositions from Ohkuma et al. '634 and the evidence from Roth et al. '814 that sulfonium salts are known to act as thermal cationic curing agents and to use the glass substrates, spacers and AR coatings taught by Hegel et al. '008 based upon the similarity with Dhar et al. '551.

The applicant argues that Dhar et al. does not disclose the initiators recited in the claims. This is correct, but the rejection is not based merely upon this reference and the matrix corresponds to the binder of the applicant's claims. Roth et al. teaches the curing at low temperatures as low as 20 degrees C, which is comparable to the room temperature (25 degrees C) described in Dhar et al. '551. Therefore the combination is reasonable to one skilled in the art and self consistent. The scope of the thermal initiators embraced both Kouge et al. '596 and Roth et al. '814 there is no data to support a position of unobvious results over other sulfonium salts.

The rejection stands as modified by the addition of Otaki et al. '744 for the reasons above, noting that the curing of the polymer matrix before holographic exposure is taught by Dhar et al. '551 and the flood curing afterward to cure any remaining monomer, free radically or cationically curable, is taught by Otaki et al. '744.

7. Claims 1,3,4 and 7-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhar et al. '551, in view of Ohkuma et al. '634, Otaki et al. '744, Kouge et al. '596, Roth et al. '814 and Hegel et al. '008, further in view of Horimai et al., WO 02/15176

Horimai et al., WO 02/15176 (Hormai et al. '891 is US equivalent) teaches with respect to figure 1, a holographic recording medium which comprises a substrate (2), a holographic recording layer (photopolymers) (3), a second substrate (4) and a reflective layer (5). The reflective layer and the recording layer can be next to each other (12/5-23; 11/40-64). The

interference fringes results from the interferences from the light passing through the layer toward the reflective layer and that reflected back into the laser from the reflective layer. (col 5. ?; 4/53-5/7).

In addition to the basis provided above, it would have been obvious to one skilled in the art to modify the embodiments rendered obvious by the combination of Dhar et al. '551 with Ohkuma et al. '634, Kouge et al. '596, Roth et al. '814 and Hegel et al. '008 as set forth above by adding a reflective layer on the further substrate as taught Horimai et al., WO 02/15176 to allow holographic recording without a second beam.

The rejection stands as modified by the addition of Otaki et al. '744 for the reasons above.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamada et al. '486 teaches useful oxetane containing monomers for holography. [0030] Malik et al. '483, Crivello et al. '084, Otsuka et al. '779, Mozner et al. '903, Sugiyama et al. '636, Kuriyama et al. '760, Kashima et al. '484, Yamamoto '563, Masutani et al. '948, Nishibayashi et al. '571, and Tsuchida et al. '259 are English equivalents of some of the references cited by the applicant for disclosures of oxetane containing monomers at [0081] of the prepub.

JP 06-016804, JP 08-245783, JP 2001-342194 and JP 2001-302651 are some of the references cited by the applicant for disclosures of oxetane containing monomers at [0081] of the prepub.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebrannndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

01/11/2008